HHS Public Access

Author manuscript

Thromb Res. Author manuscript; available in PMC 2017 September 01.

Published in final edited form as:

Thromb Res. 2016 September ; 145: 65–66. doi:10.1016/j.thromres.2016.07.018.

Cost-of-illness models for venous thromboembolism: One size does not fit all

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Keywords

Venous thromboembolism; Cost-of-illness analysis; Health economics; Indirect costs; United States

I appreciate this opportunity to respond to comments by Mahan and colleagues [1] on our recent review of US estimates of medical costs attributable to venous thromboembolism (VTE) [2]. Prior to the publication of that article, Dr. Mahan, provided helpful comments on our draft manuscript. He and his colleagues have made important contributions to raising awareness of the economic burden of VTE.

I would like to clarify that our article was not intended as a comprehensive cost-of-illness (COI) study. Our article sought to generate consensus estimates of direct medical costs attributable to VTE in order to project benefits of VTE prevention in the United States. This study, initiated during 2011–2013, was one part of a health economics research agenda on VTE for the Division of Blood Disorders at the US Centers for Disease Control and Prevention (CDC). Other studies were initiated to provide information to improve estimates of the indirect costs of VTE, including a cohort study in Norway of permanent work disability secondary to incident VTE [3].

In order to facilitate the inclusion of productivity costs in COI studies, I have published “human capital” estimates of annual and lifetime present values of market and nonmarket productivity in the United States [4]. Some economists argue that the conventional human capital approach overstates the economic impact of removing people from the work force and recommend a “friction cost” method that only includes the transition cost of replacing a disabled or deceased worker with a new worker [5].

The choice of which costs to include in a given COI analysis depends on the purpose of the study. Many COI estimates are used to inform cost-effectiveness analyses (CEAs) of interventions. For CEAs, it is generally recommended that only direct costs be included,

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Disclosure statement: No financial disclosures were reported by the author of this paper.

Disclaimer: The findings and conclusions in this report are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

although some guidelines call for the inclusion of productivity costs in CEAs from the societal perspective [6]. Numerous CEAs of anticoagulant use for VTE management or prevention have been published, almost all of which have taken the healthcare perspective and used estimates of direct medical costs without productivity costs.

The authors assert that CDC "recently acknowledged that indirect costs should be included in cost-of-illness models." That assertion is incorrect; CDC has never issued guidance on which costs should be included in COI analyses. The reference cited provides no support. A presentation on COI methods hosted on the CDC website notes that COI studies can be either restricted to medical costs or include both direct and indirect costs. COI studies from the healthcare perspective are restricted to medical costs, whereas societal-perspective COI studies typically include both direct and indirect costs. Both approaches are acceptable, with a slight majority of COI studies including indirect costs [7].

The second "key disagreement" is whether incidence-based COI estimates are preferred to prevalence-based estimates for assessing the value of VTE prevention. A prevalence-based cost estimate indicates costs for persons alive in 2015 who had ever been diagnosed with a condition, either in 2015 or in previous years, which resulted in medical costs, disability, or death during 2015. An incidence-based cost estimate, in contrast, calculates the present value of expected costs during 2015 and future years resulting from new cases during 2015, including future complications from those cases [8]. In other words, prevalence-based COI studies calculate present-year costs for cases occurring in previous years or the present year, and incidence-based COI studies start with new cases and look forward to calculate expected costs in present and future years. The implication is that a prevalence-based cost estimate for VTE assesses the hypothetical annual cost savings that could have been realized if no one alive in the present year had ever experienced VTE, whereas a forward-looking incidence-based cost estimate predicts how much could be saved by preventing new cases of VTE.

Mahan et al. [1] assert that "evaluation of prevalence versus incident new cases is a more plausible approach to determine the burden of disease and financial impact of complications such as PTS and CTPH." Prevalence-based COI estimates are indeed commonly used for burden of disease calculations, in part because they are relatively straightforward to calculate [8–10]. However, if the intent is to estimate the financial impact of preventing new cases of VTE and their downstream complications, forward-looking incidence-based cost models are needed [8].

In conclusion, our article was not intended as a comprehensive COI analysis, but rather to synthesize US estimates of medical costs associated with incident cases of VTE [2]. Indirect costs are important to societal-perspective COI studies, and more research is needed to quantify the productivity losses resulting from VTE. The newly published study linking incident VTE to subsequent receipt of disability pensions in Norway [3] represents one contribution to that goal.

COI studies are conducted for different purposes. In order to inform economic evaluations of VTE prevention, forward-looking incidence-based models are needed. Whether indirect costs are relevant to include in a specific study depends on the study purpose, and COI

studies may be appropriately restricted to medical costs [10]. The choices involved in setting up COI models can be complex, and readers should seek to understand the appropriate uses of each type of cost model.

Acknowledgments

Helpful comments were received from Rich Nelson, Kwame Nyarko, Stuart Shapira, Mike Soucie, and Norm Waitzman.

Conflict of interest statement: There was no study sponsor and the author received no funding to support this work.

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